

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-216322

(43)Date of publication of application : 27.08.1993

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(51)Int.Cl. G03G 15/01  
G03G 7/00  
G03G 15/20  
G03G 15/22

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## (54) COLOR IMAGE FORMING METHOD

## (57)Abstract:

PURPOSE: To obtain color images having rich color tones, excellent color reproducibility, high resolving power and excellent glossiness by sticking color toners of specific grain sizes at a specific quantity of deposition onto a transparent resin layer and heating, melting and fixing these toners, thereby forming the color images.

CONSTITUTION: The transparent resin layer 3A consisted of a thermoplastic resin and having 20 to 200 $\mu$ m thickness is made to exist on the surface of a transfer body 1A and the color toners of 3 to 9 $\mu$ m volumetric average grain size are stuck thereon at 0.2 to 4.0mg/cm<sup>2</sup> per color. These color toners are heated, melted and fixed to form the color images. Namely, the color toners consisting of particulates are used as the color toners and the transparent resin layer 3A of the layer thickness corresponding to the color toner images 2A after fixing is made to exist on the surface of a transfer body 1A. The color toner images 2A are then so fixed as to be embedded into the transparent resin layer 3A, thereby the color images are formed. There is no scattering of illuminating light and the quantity of the reflected light and transmitted light is large if the fixed color toner images 2A are embedded into the transparent resin layer 3A.



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**LEGAL STATUS**

[Date of request for examination] 06.11.1998

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3155804

[Date of registration] 02.02.2001

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

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[Claim(s)]

[Claim 1] A color toner is set on an imprint object to melting and the color picture formation method which fixes and forms a color picture. The transparent resin layer of 20-200-micrometer \*\* which consists of thermoplastics at least is made to exist in the front face of the aforementioned imprint object. It is the color toner of 3-9 micrometers of volume mean particle diameters on this transparent resin layer Per [ 0.2 ] color - 4.0 mg/cm<sup>2</sup> The color picture formation method which is made to adhere in coating weight and is characterized for this by heating, melting, and fixing and forming a color picture.

[Claim 2] the member which builds in a heat source in the color-picture formation method according to claim 1 -- the color-picture formation method characterized by to heat the color toner which adhered on the transparent resin layer of the front face of an imprint object, to carry out melting into a transparent resin layer, to cool subsequently, to make it fix with the belt-like conveyance object which moves downward, to separate an imprint object from a belt-like conveyance object further, and to form a color picture

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the color picture formation method that a color tone can form the clear color picture which was abundant, was excellent in color-reproduction nature, and was excellent in glossiness, especially about the color picture formation method which forms a color picture by the xerography using a color copying machine or a color printer.

[0002]

[Description of the Prior Art] As a method of forming a color picture by the xerography On the photo conductor using an organic or inorganic photoconductivity material, for example, for example, B (blue), Irradiate the color-separation light obtained through filters, such as ND (neutral), according to G (green), R (red), and the need, and an electrostatic latent image is formed according to a color. Develop serially the electrostatic latent image according to these colors with color toners, such as BK (black), according to Y (yellow), M (Magenta), C (cyanogen), and the need, and a color toner image is formed according to a color. The toner image of each color is piled up and imprinted on an imprint object every, whenever it forms the toner image concerned, and there is a method which heats these toner images, is established and forms a color picture. Moreover, the package imprint of the color toner image on which the color toner image according to the aforementioned color is piled up and formed not on an imprint object but on a photo conductor, and was put as an option is carried out on an imprint object, and there is a method which heats this, is established and forms a color picture.

[0003] By the way, a color toner usually dissolves or carries out distributed content of various kinds of colors or pigments etc. as a coloring agent into a binder resin, and it is constituted, and let particle size be 10 micrometers of numbers from several micrometers. Since such a two or more layers color toner is piled up on an imprint body surface, and this is heated, it is fixed to it and a color picture is formed, on the surface of a color picture, the irregularity (refer to the JP,63-92965,A 3rd view) of about 10-100 micrometers is formed.

[0004] When it follows, for example, a color picture is formed in a regular paper etc. using a color copying machine or a color printer, and the lighting light which carries out incidence to the color picture concerned comes to reflect irregularly on the color picture front face where irregularity is intense and observes with the naked eye, there is color muddiness, and color-reproduction nature is bad and visible to the picture inferior to glossiness. Moreover, when the color picture was formed in the bright film etc., for example, OHP is equipped with this and a projection picture is formed, the color-reproduction nature of a projection picture is bad by the scattered reflection on the front face of a color picture, and it is indistinct, and a picture looks dark with shortage of the effective quantity of light.

[0005] From such a situation, 10-500 micrometers of technology which uses the color toner of 8 micrometers of mean particle diameters, forms a color toner image, is established by the hot calender roll in this, and forms a color picture on imprint objects, such as paper which prepared the transparent resin layer of 25-300-micrometer \*\* preferably, are proposed, for example (JP,3-38659,A). Moreover, the technology which forms a color toner image, heats this by the hot calender roll, is made to carry out

the 2-4-layer laminating of the color toner of 10-15 micrometers of mean particle diameters, and to carry out melting of the color toner into a transparent resin layer, is established, and forms a color picture on imprint objects, such as paper which prepared the transparent resin layer of 50-100-micrometer \*\*, for example, is proposed (JP,63-92965,A). Furthermore, on the transparent imprint object for OHP, the transparent resin layer of 2-20-micrometer \*\* is prepared preferably, and 0.1-50 micrometers of technology which uses the color toner of 12 micrometers of mean particle diameters, forms a color toner image on this transparent resin layer, is established by the hot calender roll in this, and forms a color picture are proposed, for example (JP,62-232671,A). with the technology of each above official report, in case a color toner image is established on an imprint object, by pressurizing the color toner image concerned by the hot calender roll, it is established so that it may heat and fuse and may embed into the transparent resin layer of an imprint body surface, and a color picture with little surface irregularity is formed, the scattered reflection of lighting light is mitigated, and a good color picture is obtained -- it is made like

[0006]

[Problem(s) to be Solved by the Invention] however, with the technology of each aforementioned official report, since the covering power at the time of color picture formation (covering power) is small, in order the particle size of a color toner is excessive, and to obtain desired color concentration, there is the need of making more color toners adhering. Moreover, in a color toner with a big particle size, there is much space between particles at the time of fixing, it is easy to become bulky, and the problem of it being bad and being hard to carry out color mixture also has the compatibility between particles further. For this reason, after imprinting a color toner image on the transparent resin layer of an imprint object, it pressurizes by the hot calender roll, and heating, melting, and in case it is established, a color toner image is not fully embedded into a transparent resin layer, but the problem in which the color picture which has irregularity in a front face too is easy to be formed remains. Moreover, in fixing by the hot calender roll, since it is pressurized and is heated and established in case an imprint object passes the nip section of a hot calender roll and a pressure roll for a short time, the color toner once embedded into the transparent resin layer comes up to a front face again, and there is a problem of worsening the surface state of a color picture. furthermore, with the technology of each aforementioned official report, it is not necessarily suitable at a relation with the thickness of the color toner layer to which it adheres on an imprint object, and it considers as thick \*\* at the non-need, or let thickness of the transparent resin layer prepared on an imprint object be thickness inadequate for embedding a color toner

[0007] It is in offering the color picture formation method that the color picture which was abundant, was excellent in color-reproduction nature, and a color tone is high resolution and was excellent in glossiness is obtained in the method which this invention is made in view of the above situation, and the purpose makes a transparent resin layer exist in the front face of an imprint object, is established in a color toner on this transparent resin layer, and forms a color picture.

[0008]

[Means for Solving the Problem] The above purpose sets a color toner on an imprint object to melting and the color picture formation method which fixes and forms a color picture. The transparent resin layer of 20-200-micrometer \*\* which consists of thermoplastics at least is made to exist in the front face of the aforementioned imprint object. It is the color toner of 3-9 micrometers of volume mean particle diameters on this transparent resin layer Per [ 0.2 ] color - 4.0 mg/cm<sup>2</sup> It is made to adhere in coating weight and this is attained by heating, melting, and the color picture formation method characterized by fixing and forming a color picture. moreover, the member which builds in a heat source in the above color picture formation method -- it is desirable to heat the color toner which adhered on the transparent resin layer of the front face of an imprint object, to carry out melting into a transparent resin layer, to cool subsequently, to make it fix with the belt-like conveyance object which moves downward, to separate an imprint object from a belt-like conveyance object further, and to form a color picture

[0009] namely, by the color picture formation method of this invention For example, imprint the color toner image on the photo conductor formed of the xerography on an imprint object, and heating, melting, in case it is established and a color picture is formed, while using the thing of a particle as a

color toner, this The transparent resin layer of the thickness corresponding to the thickness of the color toner image after fixing is made to exist in the front face of an imprint object, it is established so that a color toner image may be embedded into a transparent resin layer, and a color picture is formed. by this composition In the color picture obtained, the scattered reflection of lighting light is prevented, the quantity of light of the reflection from a color picture or transparency becomes abundant, and the outstanding glossiness can be given now.

[0010] Hereafter, this invention is explained concretely. (a) of drawing 1 and (b) are drawings explaining reflection or the transparency situation of lighting light in case there is no transparent resin layer, and are drawing explaining reflection and the transparency situation of lighting light when (c) of drawing 1 and (d) have a transparent resin layer and a fixing color toner image is embedded into the transparent resin layer concerned. In drawing 1, the transfer paper and 1B which 1A becomes from a regular paper are [ a fixing color toner image and 3A of bright films, such as an OHP sheet, and 2A ] transparent resin layers. When fixing color toner image 2A is embedded into transparent resin layer 3A so that clearly from drawing 1, there is no dispersion of lighting light, reflection and the amount of transmitted lights become abundant, gradation nature is good and the color picture which is excellent in glossiness is obtained.

[0011] moreover, the member which builds in a heat source in this invention -- it is desirable to heat the color toner which adhered on the transparent resin layer of the front face of an imprint object, to carry out melting into a transparent resin layer, to cool subsequently, to make it fix with the belt-like conveyance object which moves downward, to separate an imprint object from a belt-like conveyance object further, and to form a color picture As fixing equipment for carrying out this desirable mode, (a) of drawing 2, (b), etc. are mentioned, for example.

[0012] As for an imprint object and 2, in drawing 2, 1 is [ a color toner image and 3 ] heating rollers. The heating roller 3 has the heat sources 6, such as an electrical heater or an infrared lamp, inside. Moreover, the elastic layers 5, such as rubber, are formed in the periphery of the core 4 usually fixed to the axis of rotation by the heating roller 3. For 7, a pressure roll and 8 are [ a top heatproof belt and 8b of a heat-resistant belt and 8a ] bottom heatproof belts. These heat-resistant belts consist of a polyimide, a polyethylene terephthalate (PET), an aromatic polyamide, etc. It is a pressure roll [ as opposed to / as opposed to / an ablation roll / in 9 ] the ablation roll concerned in 10 /. The pressurization spring for the separation presser foot stitch tongue of the imprint object 1 in which 11 is prepared as occasion demands, and 12 carrying out heating conveyance of the imprint object 1 under pressurization, and 15 are the guide plates for imprint object conveyance.

[0013] the member in which the imprint object 1 which all supported the color toner image 2 has a heat source 6 in each fixing equipment of drawing 2 -- it is heated and conveyed with the heat-resistant belts 8, 8a, and 8b which move downward, and the color toner image 2 on the aforementioned imprint object 1 is separated by melting and the post-ablation roll 9 which it was established and was cooled by cooling meanses, such as natural air-cooling and a cooling fan In addition, as the aforementioned cooling means, it circulates through cooling water on the ablation roll 9, and you may cool on it.

[0014] With each fixing equipment of drawing 2, since the color toner image 2 is divided into the bottom of conveyance of the heat-resistant belts 8, 8a, and 8b by ablation roll 9 grade after it is made into the state of it being cooled and being hard to deform, being conveyed in the state where it was embedded into the sticking-by-pressure, heating, and transparent resin layer which melting is carried out and exists in the front face of the imprint object 1, a color picture with a very smooth front face is obtained. Although a transparent resin layer is made to exist in the front face of an imprint object, this transparent resin layer may be beforehand prepared in the imprint object in one, and you may make it prepare it in this invention using an electrophotography process in the case of formation of a color picture.

[0015] As an imprint object, both the opaque imprint object for the usual color pictures and the transparent imprint object for OHP can be used. As a former opaque imprint object, the paper sheet of wood pulp fiber, a converted paper, a synthetic paper, a sheet plastic, a metal sheet, etc. are used. As a transparent imprint object for the latter OHP, polyester film, such as a polyethylene terephthalate, a

polyether sulphone film, etc. are used, for example. In addition, when preparing a transparent resin layer in the case of formation of a color picture, the above imprint object can be used as it is.

[0016] What is necessary is on the other hand, just to prepare the transparent resin layer which consists of thermoplastics of 20-200-micrometer \*\* in the front face of the aforementioned opaque imprint object or a transparent imprint object, in using the imprint object with which the transparent resin layer was prepared beforehand. in addition, between the aforementioned opaque imprint object in order to obtain the color picture which enriches the reflected light of a color picture and is more excellent in glossiness, and transparent resin layers -- for example, CaO, BaO, SrO, ZnO, TiO<sub>2</sub>, and BaSO<sub>4</sub> etc. -- you may prepare the reflecting layer which carried out distributed content of the white pigments

[0017] As thermoplastics which constitutes the transparent resin layer made to exist in the front face of an imprint object, a cellulose system resin, a polyvinyl alcohol resin, casein, etc. are mentioned by the kind of styrene resin, acrylic resin, styrene-acrylic resin, styrene-butadiene resins, vinyl chloride resin, a vinyl acetate resin, a vinyl-chloride-vinyl-acetate-copolymer resin, the vinyl chloride-vinyl acetate-maleic-acid copolymer resin, polyester resin, a polyurethane resin, polyimide resin, polyamide resin, an epoxy resin, vinyl butyral resin, and other materials, for example. Usually, the aforementioned transparent resin layer dissolves in the solvent of water or an alcoholic system, a ketone system, a halogen system, an ester system, and a furan system, it can be applied on an opaque imprint object or a transparent imprint object, can dry this, and can form thermoplastics.

[0018] the thickness of the aforementioned transparent resin layer -- the thickness of a color toner image -- taking into consideration -- 20-200-micrometer \*\* -- it considers as 20-80-micrometer \*\* preferably If too little [ the thickness of a transparent resin layer ], a color toner image is not fully embedded into a transparent resin layer, when it is established, melting and, but a color picture with much irregularity is formed. On the other hand, by spreading a color toner image in a transparent resin layer, and resolution declining, if the thickness of a transparent resin layer is excessive, since the transparent resin layer is too thick, the problem that application processability becomes bad arises. Moreover, the softening temperature of the thermoplastics used for a transparent resin layer is equivalent to the softening temperature of the binder resin of a toner, or it is desirable that it is preferably high about 10-30 degrees C.

[0019] When making the aforementioned transparent resin layer exist in the front face of an imprint object in the case of formation of a color picture, a transparent solid toner layer is formed on a photo conductor, using the transparent toner which consists of thermoplastics at least, it imprints so that this transparent toner layer may be located in the front-face side of an imprint object, and it can be heated and established with the aforementioned fixing equipment, and can form. Furthermore, the bright film of 20-200-micrometer \*\* which consists of thermoplastics may be laminated on the front face of the aforementioned transparent imprint object or an opaque imprint object, and a transparent resin layer may be formed in it.

[0020] As a developer containing the color toner used for this invention, a two-component system developer is preferably used from a viewpoint which aims at improvement in a fluidity, triboelectrification nature, and development nature. Moreover, as this two-component system developer, what consists of a nonmagnetic particle color toner and a magnetic carrier particle is desirable. In this invention, the particle size of a color toner is important and the color toner whose volume mean particle diameter is 3-9 micrometers is used. In a less than 3-micrometer color toner, fogging increases at the time of development, and a volume mean particle diameter becomes complicated [ a manufacturing process ], and a manufacturing cost becomes large. On the other hand, in the color toner with which a volume mean particle diameter exceeds 9 micrometers, since the resolution of a color picture declines and the covering power of a color toner falls, it will be necessary to make a color toner image adhere thickly, therefore using a belt-like conveyance object, heating, melting, and when it is established, a color toner image is not fully embedded into a transparent resin layer, but problems -- a color picture with a front face smooth as a result is not obtained -- arise. Here, the volume mean particle diameter of a color toner is measured by the Coulter counter by the coal tar company. In this invention, the color toner whose volume mean particle diameter is 3-9 micrometers is used, and it is the color toner coating weight

to an imprint object top Per [ 0.2 ] color - 4.0 mg/cm<sup>2</sup> The coating weight of the whole color toner piled up since it carried out is 0.6 - 16 mg/cm<sup>2</sup>. It becomes a range, the color picture of sufficient concentration is obtained, and the smooth color picture which moreover does not have irregularity is obtained.

[0021] As a method of obtaining a nonmagnetic particle color toner (1) An electric charge control agent is mixed for a coloring agent 5 or less % of the weight as occasion demands 20 or less % of the weight in a binder resin. It mills, cools and grinds, it classifies so that it may become the aforementioned size range, and the method of carrying out a polymerization to the bottom of churning of the thing which made melting, the method of heat-treating as occasion demands further and globular-form-izing, (2) coloring agents, and other additives contain in the monomer of a binder resin, and obtaining a globular form toner etc. is mentioned.

[0022] As a binder resin used for a color toner, an epoxy resin etc. is mentioned, for example to condensation polymerization type resins, such as addition polymerization type resins, such as styrene resin, styrene-acrylic resin, styrene-butadiene resins, and acrylic resin, and polyester resin, and a pan.

[0023] As a monomer for forming an addition polymerization type resin among these resins, styrene, ethylene system unsaturation monoolefins, alpha-methylene aliphatic monocarboxylic-acid ester, an acrylic acid, or a methacrylic-acid derivative is mentioned. These monomers are independent or may be used combining two or more sorts of things. As a monomer for forming a condensation polymerization type resin, ethylene glycol, a triethylene glycol, 1, 3-propylene glycol, etherification bisphenol A, a terephthalic acid, an isophthalic acid, boletic acid, a maleic acid, etc. can be mentioned.

[0024] As an electric charge control agent used for a color toner, a well-known thing is used conventionally, and the positive electric charge control agent specifically indicated by each official report of the negative electric charge control agent indicated by each official report of JP,59-88743,A, 59-88745, 59-79256, 59-78362, 59-228259, and 59-124344, JP,51-9456,A, 59-204851, 59-204850, and 59-177571 is mentioned.

[0025] Moreover, it is the purpose which prevents the offset phenomenon by adhesion on the fixing roll of a toner, and low-molecular-weight polyolefines (polypropylene, polyethylene, wax, etc.) etc. may be made to contain at 0 - 5% of the weight of a rate in a binder resin in a color toner. Moreover, you may carry out addition mixture of a hydrophobic silica, colloidal silica, the silicone varnish, etc. from the outside at 0 - 3% of the weight of a rate in order to give a fluidity, an electric charge controllability, etc. to a color toner. Furthermore, you may carry out addition mixture of the cleaning assistants, such as a fatty-acid metal salt and a fluorine surfactant, etc. from the outside.

[0026] As a coloring agent used for a color toner, a well-known thing is used conventionally, and, specifically, chlromophtal red, process-variable fast red, a rhodamine color, etc. can be mentioned as a benzidine yellow, quinoline yellow, chromophthal yellow, and an M (Magenta) toner as a copper phthalocyanine blue and a Y (yellow) toner as carbon black and a C (cyanogen) toner as a BK (black) toner.

[0027] As a carrier which constitutes a two-component system developer, the non-covering carrier which used (1) magnetic-substance particle as it was, the resin covering carrier which comes to cover a resin on the front face of (2) magnetic-substance particle, the magnetic-substance distributed carrier with which distributed content of the magnetic-substance particle was carried out into (3) binder resin are mentioned. Also in these, a resin covering carrier is desirable especially. As a magnetic-substance particle, the powder of various kinds of magnetic materials, such as iron, a ferrite, and a magnetite, is used, for example.

[0028] The weighted-mean particle size of a carrier has desirable 20-120 micrometers. Moreover, in order for a charge to be poured into a carrier by bias voltage, and for a carrier to adhere to a photo conductor side or to prevent bias voltage leaking and vanishing a latent-image charge, the volume resistivity of a carrier is 10<sup>8</sup>. More than omega-cm is desirable and especially the insulating thing of 10<sup>14</sup> or more ohm-cm is desirable. Here, the weighted-mean particle size of a carrier is measured by the Coulter counter by the coal tar company. Moreover, the volume resistivity of a carrier is a measuring object particle 0.5cm<sup>2</sup> It is 1 kg/cm<sup>2</sup> on the particle packed after putting into the container which has



the cross section and tapping. A load is applied, the voltage which the electric field of 102 - 105 V/cm produce between a load and a base electrode is impressed, the current value which flows then is read, and it asks by performing predetermined calculation. In addition, the carrier particle layer thickness at the time of an amperometry is about 1mm.

[0029] Moreover, in a carrier, in order to make it hard to raise the triboelectrification nature between a carrier and a toner while raising a fluidity, and to happen blocking between carrier particles or a carrier, and a toner, a globular form thing is desirable. What is necessary is just to carry out coating of the resin for covering to the magnetic-substance particle which was beforehand fabricated by the globular form in the case of the resin covering carrier at the thin layer of for example, 0.1-2-micrometer \*\* (it is 0.5 - 5% of the weight of the amount of resins to a carrier weight), in order to obtain this globular form carrier. Moreover, what is necessary is in the case of a magnetic-substance distributed carrier, to heat-treat and globular-form-ize the magnetic-substance particulate material which comes to distribute a magnetic-substance impalpable powder at 30 - 70% of the weight of a rate in a binder resin, or just to manufacture a direct globular form particle by the spray-drying method. Although the above color toner and carrier are mixed and a two-component system developer is obtained, the rate of the blending ratio of coal from which toner concentration becomes 2 - 15 % of the weight is desirable.

[0030] Whenever it carries out image exposure by the analog method, and it forms the electrostatic latent image according to color, for example on a photo conductor in the color picture formation method of this invention, and develops this with each color toner of C, Y, B, and BK and forms each color toner image, it piles up and imprints on a middle imprint belt every, the package imprint of this is carried out on an imprint object, and it is established and you may make it form a color picture.

[0031] Moreover, like the digital color copying machine indicated by JP,61-111071,A, for example, a color picture signal is read with a color scanner, image exposure of the laser beam modulated by the color picture signal concerned may be carried out on a photo conductor, an electrostatic latent image may be formed, the electrostatic latent image concerned may be developed with each color toner of C, M, Y, and BK, and a color picture may be formed. In this case, after twisting it around an imprint drum every, imprinting it on the fixed imprint object, whenever each color toner image formed on a photo conductor formed the color toner image, forming the color toner image which each color toner image piled up on the imprint object concerned and releasing the imprint object concerned from an imprint drum, it is established and a color picture is formed.

[0032] Moreover, the package imprint of this is carried out on an imprint object, and it is established and you may make it pile up each color toner image of Y, M, C, and BK with a digital method on the photo conductor concerned, form by two or more rotations of a drum-like photo conductor, and form a color toner image like color picture formation equipments, such as a digital color copying machine indicated by each official report of JP,59-34546,A and 59-61865, or a color printer. According to this color formation equipment, especially, the superposition precision of each color toner image is high, and it has an advantage -- the color picture excellent in resolution is obtained. In this invention, even if it applies which the above-mentioned color picture formation method, the high-definition color picture which is excellent in glossiness can be obtained by using said specific imprint object.

[0033]

[Example] Although an example explains this invention concretely below, thereby, the mode of operation of this invention is not limited.

[0034] Example 1<A HREF="/Tokujitu/tjitemdrw.ipdl?N0000=239&N0500=1E\_N/; :-> 9 <=///&N0001=603&N0552=9&N0553=000006" TARGET="tjitemdrw"> drawing 3 is the cross sections of the color picture formation equipment explaining the color picture formation method of this example, and, for K, a picture read station and L are [ the image formation section and N of each unit of the laser write-in section and M ] the feed sections. Picture read station K consists of the carriage 22 with which the mirror 25 and the halogen lamp 24 were attached, the movable mirror unit 23 in which mirrors 26 and 27 were attached, a lens 30, color-separation-filter equipment 32, CCD33, and an image processing system 34. The laser write-in section L consists of a motor 41 and polygon mirror 42 grade. The photo conductor 40 with which the organic photoconduction layer in which the image formation

section M contains a screw azo pigment was prepared, Pre-exposure lamp 45A, scorotron electrification machine 45B, and the AC bias P1, The development counters 46Y, 46M, and 46C and 46BK(s) with which the developer containing the negative polarity toner of Y, M, C, and BK with which DC bias P2 was impressed was filled up, It consists of the imprint machine 47 which carries out the package imprint of the color toner image formed in the photo conductor 40 at an imprint object, an eliminator 48, a fixing assembly 55 established in a color toner image, and cleaning equipment 49 from which the toner which remains on a photo conductor 40 is removed. The feed section N has the send rollers 51A and 51B and the timing roller 52 for sending out the imprint objects PA or PB to the imprint machine 47 and an eliminator 48 from the feed cassettes 50A or 50B.

[0035] The laminating of the transparent resin layer in which the polyvinyl-butylal layer of 1-micrometer \*\* to which the imprint objects PA and PB carry out distributed content of 5% of the weight of the ZnO at the paper of fine quality of 50-micrometer \*\* is prepared and which it turns into from the vinyl-chloride-vinyl-acetate-copolymer resin of 40-micrometer \*\* on it further is carried out.

[0036] Based on the timing diagram of drawing 4, the color picture was formed using the color picture formation equipment constituted as mentioned above. That is, "having turned on" on the computer button, the initialization signal was made to output to picture read station K through a control circuit, and it set to B filter in filter equipment 32. In 1 rotation eye of a photo conductor 40, carried out light scanning of the manuscript 20 on the manuscript base 21 of picture read station K with the halogen lamp 24 of carriage 22, the light-receiving side of CCD33 was made to carry out image formation of the light figure of a manuscript through a lens 30 through the color-separation-filter equipment 32 with which the aforementioned mirror groups 25, 26, and 27 and B filter which are driven with a stepping motor were set, and it changed into the electrical signal. In the image processing system 34, signal processing, such as A/D conversion, a shading compensation, gradation amendment, color conversion, ghost processing, and multiple-value-izing, was performed for the acquired electrical signal, and Y picture signal which is the 1st chrominance signal was outputted to the following laser write-in section L.

[0037] On the 40th page of the photo conductor which carried out the rotation scan of the laser beam oscillated from the source of laser by the polygon mirror 42 by which carries out PDM according to the aforementioned Y picture signal, and a rotation drive is carried out by the motor 41, bent the optical path by the mirror 44 through the ftheta lens 43, and gave uniform electrification beforehand by pre-exposure and electrification machine 45B by pre-exposure lamp 45A, image exposure was carried out and the electrostatic latent image was formed. Negatives were developed by the non-contact reversal development method under impression of the aforementioned AC bias P1 and DC bias P2 with the two-component system developer containing Y toner held in development counter 46Y in this electrostatic latent image, and Y toner image was formed. The bottom of the cleaning equipment 49 made to already have estranged from the field of a photo conductor 40 was passed holding obtained Y toner image to a photo conductor 40, and it conveyed to electrification machine 45B with the 2nd rotation of a photo conductor 40 that the following M toner image should be formed.

[0038] By electrification machine 45B, the front face of the photo conductor 40 in the state where Y toner image was supported is uniformly re-charged in negative. Subsequently, in filter equipment 32, switch to G filter, and the scan next to picture read station K performs image exposure of the laser beam based on M picture signal which is the 2nd chrominance signal from an image processing system 34. The electrostatic latent image was formed on the photo conductor 40, non-contact reversal development was carried out like the case of development counter 46Y by development counter 46M, and M toner image was piled up and formed on Y toner image. Like the following, through image exposure of the laser beam based on BK picture signal using the development and the ND filter by image exposure of the laser beam based on C picture signal using R filter, and development counter 46C, and the development by development counter 46BK, C toner image and BK toner image were piled up, and the color toner image was formed in 3 rotation eye and 4 rotation eye of a photo conductor 40 on Y toner image on a photo conductor 40, and M toner image. In addition, the coating weight to the photo conductor 40 of a color toner carried out as it was shown in the after-mentioned table 1.

[0039] The package imprint was carried out in the operation of the imprint machine 47 on the imprint

object PA of the aforementioned lamination which doubled image formation and timing, sent out the obtained color toner image from cassette 50A, and conveyed it to the imprint field through roller 51A and the timing roller 52 (A4, crossfeed). In addition, 50B is a cassette which holds the imprint object PB (B4, longitudinal feed) of the aforementioned lamination. After the eliminator 48 separated the imprint object PA with which the color toner image was imprinted from the photo conductor 40, it conveyed to the fixing assembly 55 with the conveyance belt 54, and heating fixing was carried out by the fixing assembly 55 concerned, the color picture was formed, and it discharged to the delivery pan 57 with the delivery roll 56. In addition, a fixing assembly 55 is the thing of the composition of (a) of drawing 2.

[0040] In addition, in this example, each development counters 46Y, 46M, and 46C and the developers contained to 46BK are as follows.

Fused, milled and cooled them, they were ground, the developer polyester resin 100 weight section for development counter 46Y, the benzidine-yellow 10 weight section, the metal complex color 1 weight section, and the polypropylene 2 weight section with a softening temperature of 125 degrees C were classified, and the yellow toner of 6 micrometers of volume mean particle diameters was obtained. The enveloping layer of 1.0-micrometer \*\* which becomes a globular form ferrite particle from styrene resin was prepared, and the carrier with a weighted-mean particle size of 40 micrometers was obtained by 1014 or more ohm-cm of volume resistivity. While mixing the aforementioned carrier and the toner at a rate from which toner concentration becomes 8 % of the weight, in addition, the developer for development counter 46Y was obtained at a rate which becomes 0.5 % of the weight about a hydrophobic silica.

In manufacture of the developer for developer development counter 46Y for development counter 46M, the coloring agent was changed into Rhodamine B, and also the developer for development counter 46M was obtained similarly.

In manufacture of the developer for developer development counter 46Y for development counter 46C, the coloring agent was changed into the copper phthalocyanine, and also the developer for development counter 46C was obtained similarly.

In manufacture of the developer for developer development counter 46Y for development counter 46BK, the coloring agent was changed into carbon black, and also the developer for development counter 46BK was obtained similarly.

[0041] Moreover, in the color picture formation method of this example, the main conditions are as follows.

The write-in light source to a photo conductor : Semiconductor laser (680nm)

Electrification to a photo conductor : -700V AC-bias voltage P1 : 2kV, 3kHz direct-current bias voltage

P2 : -550V development method : Non-contact reversal development environmental condition : The temperature of 20 degrees C (room temperature), 60% [0042] of relative humidity It evaluated about the following item [ color picture / which was obtained as mentioned above ]. A result is shown in the after-mentioned table 1.

] made from glossy "UGS-300A deflection glossmeter" [Nippon Denshoku Industry of a picture was used, and the glossiness (%) measured at 75 degrees of measurement angles estimated.

[0043] In examples 2-5 and the example 1 of comparison, and two examples 1, it carried out as the volume mean particle diameter of a color toner, the coating weight of a color toner, the thickness of the transparent resin layer in an imprint object, and the kind of fixing assembly were shown in Table 1, and also the color picture was formed like the example 1, and it evaluated similarly.

[0044]

[Table 1]

	カラートナーの 体積平均粒径 $\mu\text{m}$				1色当りの カラートナー の付着量 $\text{mg}/\text{cm}^2$	透明樹脂 層の層厚 $\mu\text{m}$	定着器の種類	光沢度 %
	Y	M	C	BK				
実施例 1	6.0	6.0	6.0	6.0	0.75	30	図2の(a)	76
実施例 2	8.5	8.5	8.5	8.5	0.90	50	図2の(a)	70
実施例 3	5.5	5.5	5.5	5.5	0.68	25	図2の(a)	78
実施例 4	7.0	7.0	7.0	7.0	0.83	40	図2の(a)	75
実施例 5	6.0	6.0	6.0	6.0	0.75	30	図2の(b)	78
比較例 1	6.0	6.0	6.0	6.0	0.75	30	熱ローラ定着器 (オイル塗布)	35
比較例 2	6.0	6.0	6.0	6.0	0.75	30	熱ローラ定着器 (オイルレス)	3

[0045]

[Effect of the Invention] According to the color picture formation method of this invention, the effect that the color picture which the color tone was abundant, was excellent in gradation nature, and was excellent in the glossiness near the color picture of silver salt is obtained is done so so that clearly from the above explanation.

[Translation done.]

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] (a) - (d) is drawing showing reflection or the transparency property of the lighting light when forming a color picture on the imprint object concerning this invention.

[Drawing 2] (a) and (b) are the cross sections showing the example of the fixing equipment which can be used suitable for this invention.

[Drawing 3] It is the cross section of the color picture formation equipment used in the example 1.

[Drawing 4] It is the timing chart of the color picture formation equipment of drawing 3 .

[Description of Notations]

1A Transfer paper 1B Bright film

2A Fixing color toner image 3A Transparent resin layer

1 Imprint Object 2 Color Toner Image

3 Heating Roller 4 Core

5 Elastic Layer 6 Heat Source

7 Pressure Roll 8 Heat-resistant Belt

8a Top heatproof belt 8b Bottom heatproof belt

9 Ablation Roll 10 Pressure Roll

11 Separation Presser Foot Stitch Tongue 12 Pressurization Spring

15 Guide Plate for Imprint Object Conveyance K Picture Read Station

L The laser write-in section M Image formation section

N Feed section 20 Manuscript

21 Manuscript Base 22 Carriage

23 Movable Mirror Unit 24 Halogen Lamp

25 Mirror 26 Mirror

27 Mirror 30 Lens

32 Color-Separation-Filter Equipment 33 CCD

34 Image Processing System 40 Photo Conductor

41 Motor 42 Polygon Mirror

43 FTheta Lens 44 Mirror

45A Pre-exposure lamp 45B Scorotron electrification machine

46Y, 46M, 46C, 46BK Development counter

47 Imprint Machine 48 Eliminator

49 Cleaning Equipment 50A, 50B Feed Cassette

51A, 51B Send roller 52 Timing roller

54 Conveyance Belt 55 Fixing Assembly

56 Delivery Roll 57 Delivery Pan

PA, PB Imprint object P1 AC bias

P2 DC bias

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[Translation done.]

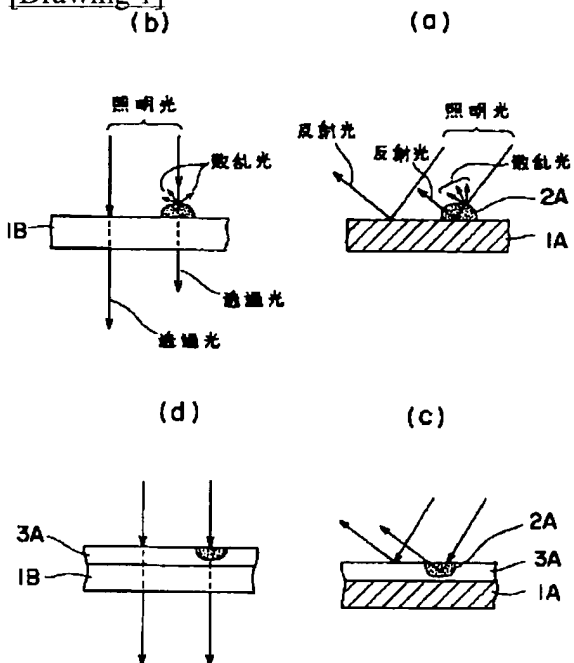
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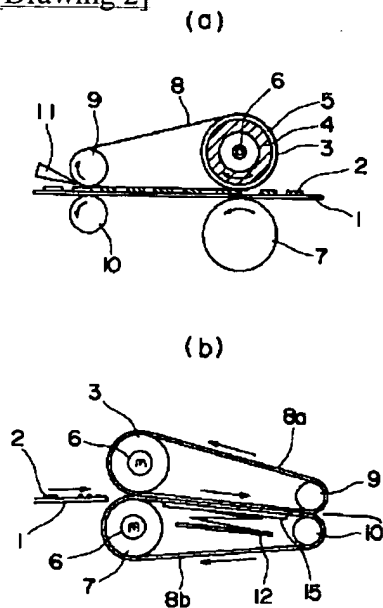
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## DRAWINGS

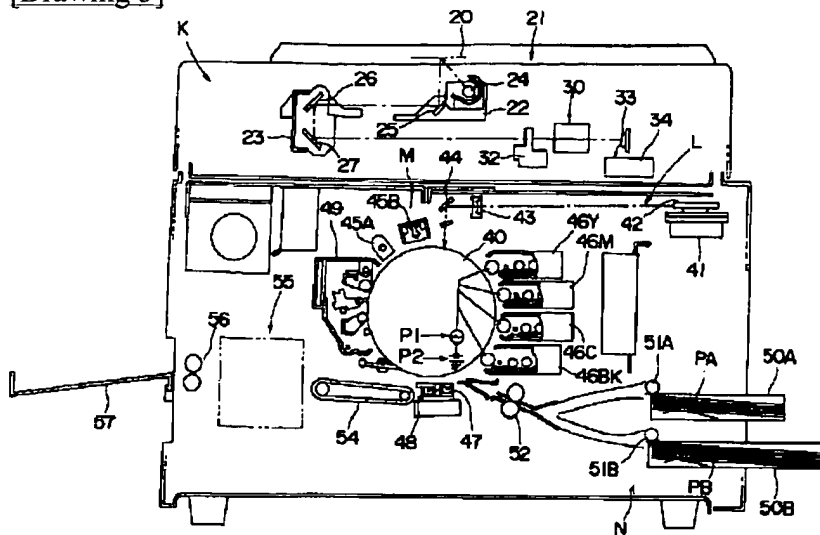
[Drawing 1]



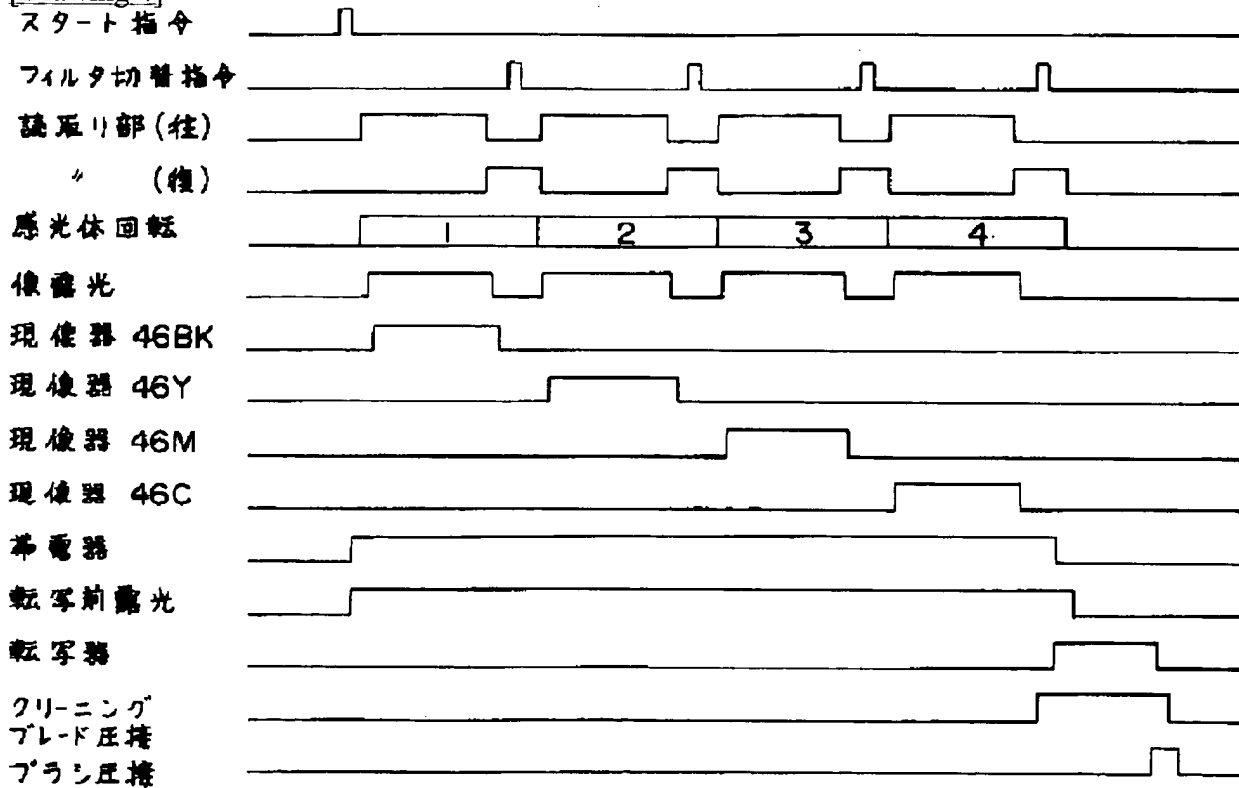
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]